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DECAPOD CRUSTACEANS FROM CAY SAL BANK, BAHAMAS, WITH NOTES ON THEIR ZOOGEOGRAPHIC AFFINITIES

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ABSTRACT

During a biological investigation of Cay Sal Bank in 1978–82 conducted on the R/V *Bellows*, an important collection of decapods was obtained in depths ranging from 1 to 498 m. The material included the heretofore figured but characterized caridean *Stylodactylus rectirostris*, and the poorly known brachyurans *Dissodactylus juvenilis* and *Micropanope pusilla*. First western Atlantic records are reported for the carideans *Ligur ensiferus* and *Plesionika williamsi*, and minor range extensions for six other species. Zoogeographic affinities of the more than 113 species collected are greatest with the fauna of the Gulf of Mexico. Distributional data indicate that the Florida Current is not a significant obstacle for decapod crustaceans but more probably serves as vehicle for the transport of larval stages across the Straits of Florida. Fifty percent of the penaeoids and carideans from the slope of the bank occur also in the eastern Atlantic.

Cay Sal Bank, in the tropical western Atlantic, occupies an area of considerable size that is strategically located between Florida, the Great Bahama Bank, and Cuba. Despite the size and position of this bank its marine fauna has not been investigated in the past. Major oceanographic expeditions to the Bahamas that have collected decapod crustaceans (see review by Garth, 1978) have been centered on the main Bahamian group of islands. Consequently, the species composition of Cay Sal Bank has remained virtually unknown. The opportunity to study the decapod fauna of the bank came during a biological expedition to Cay Sal Bank in 1978–1982 conducted on R/V *Bellows* by scientists from Florida International University (Goldberg, 1983). As a result of this investigation an important collection of decapods was obtained that included a total of 467 specimens representing 32 families and more than 113 species (Table 1). A preliminary report on this material was presented by Lemaitre (1983).

The material contains several interesting taxa and has provided the opportunity to evaluate the influence of the Florida Current on the faunal composition of the bank and to examine the zoogeographic affinities with faunas from other regions. Among the interesting taxa is the caridean *Stylodactylus rectirostris* A. Milne Edwards, known only from A. Milne Edwards' (1883) figures of the species; it is described herein. The brachyurans *Dissodactylus juvenilis* Bouvier and *Micropanope pusilla* A. Milne Edwards represent two heretofore poorly known species. The former is known only from damaged specimens, and the latter is one of the species left unassigned by Guinot (1967a) in her revision of the genus *Micropanope* Stimpson. Both brachyurans are figured and diagnosed herein. The carideans *Ligur ensiferus* (Risso) and *Plesionika williamsi* Forest, represent first western Atlantic records for species previously known only from the Mediterranean, eastern Atlantic, and Indo-Pacific region. An additional specimen of *P. williamsi*, collected in the eastern Gulf of Mexico, was found in the collections of the Florida Department of Natural Resources, Bureau of Marine Research, St. Petersburg, Florida, and has also been included. The branchial formula of *P. williamsi* is presented in order to supplement the original diagnosis. Only fragments of the diagnostic characters of *L. ensiferus* are to be found in the literature and for this reason a diagnosis and figures are given. The rare caridean *Synalpheus dominicensis* Armstrong, previously known only from the Dominican Republic, is recorded for the second time, and the most important diagnostic character is given. Also repre-

Table 1. List of decapod species collected at Cay Sal Bank, Bahamas. Symbols are as follows: * = range extension; + = known only from Antilles and/or Bahamas; o = not present in continental North America; @ = see remarks under Problem Species.

Family Genus/species	Station	Depth (m)	Number of specimens
PENAEIDAE			
@ *Metapenaeopsis* cf. *goodei* (Smith, 1885)	80-12; 80-13; 82-5	9–12	20
Parapenaeus americanus Rathbun, 1901	80-3	446	1
Parapenaeus longirostris (Lucas, 1849)	79-3; 79-7; 79-13	281–471	6
Penaeopsis serrata Bate, 1881	78-5	453	7
Plesiopenaeus edwardsianus (Johnson, 1867)	78-8	453	1
SICYONIIDAE			
Sicyonia laevigata Stimpson, 1871	80-13	9	1
Sicyonia stimpsoni Bouvier, 1905	79-13	281	2
SOLENOCERIDAE			
Hadropenaeus affinis (Bouvier, 1906)	79-5; 79-13	254–281	4
Mesopenaeus tropicalis (Bouvier, 1905)	79-13	281	2
Solenocera necopina Burkenroad, 1939	78-8; 79-7; 79-13	281–471	13
Solenocera vioscai Burkenroad, 1934	78-8	453	1
STENOPODIDAE			
Stenopus hispidus (Olivier, 1811)	80-4	16	1
STYLODACTYLIDAE			
*o+ *Stylodactylus rectirostris* A. Milne Edwards, 1883	78-1	362	1
EUGONATONOTIDAE			
Eugonatonotus crassus (A. Milne Edwards, 1881)	78-5	453	1
PALAEMONIDAE			
Periclimenaeus bermudensis (Armstrong, 1940)	80-4	16	1
Pseudocoutierea antillensis Chace, 1972	80-4	16	1
ALPHEIDAE			
Alpheus amblyonyx Chace, 1972	80-4	16	3
Alpheus formosus Gibbes, 1850	78-11	3	1
*o *Automate rectifrons* Chace, 1972	80-7	14	1
Synalpheus apiocerus Coutière, 1909	80-4	16	5
Synalpheus brooksi Coutière, 1909	80-10	9	13
*o+ *Synalpheus dominicensis* Armstrong, 1949	80-5	14	3
*o *Synalpheus obtusifrons* Chace, 1972	80-5; 80-7	14	2
Synalpheus pandionis Coutière, 1909	80-4	16	2
Synalpheus paraneptunus Coutière, 1909	80-5	14	4
Synalpheus pectiniger Coutière, 1907	80-10	9	61
HIPPOLYTIDAE			
*o *Ligur ensiferus* (Risso, 1816)	78-5	453	1
Tozeuma carolinense Kingsley, 1878	80-9	9	1
PROCESSIDAE			
Processa bermudensis (Rankin, 1900)	80-9	9	1
PANDALIDAE			
Heterocarpus ensifer A. Milne Edwards, 1881	78-2; 78-8; 79-3	428–498	4
@ *Parapandalus* sp.	79-13	281	1
Plesionika edwardsi (Brandt, 1851)	79-13	281	1
Plesionika ensis (A. Milne Edwards, 1881)	78-5	453	2
*o *Plesionika williamsi* Forest, 1963	78-5; 81-23	453–471	2

Table 1. Continued.

Family Genus/species	Station	Depth (m)	Number of specimens
CRANGONIDAE			
Pontocaris caribbaea (Boone, 1927)	79-13	281	2
Pontocaris vicina Dardeau and Heard, 1983	78-8	453	2
GLYPHOCRANGONIDAE			
Glyphocrangon spinicauda A. Milne Edwards, 1881	78-5; 78-8; 80-3	446–453	9
NEPHROPIDAE			
o *Metanephrops binghami* (Boone, 1927)	80-3	446	1
Nephropsis aculeata Smith, 1881	78-8	453	1
UPOGEBIIDAE			
Upogebia operculata Schmitt, 1924	80-4; 80-5	14–16	5
POLYCHELIDAE			
Polycheles typhlops Heller, 1862	79-3	428–446	1
PALINURIDAE			
Panulirus argus (Latreille, 1804)	80-6	14	1
DIOGENIDAE			
Calcinus tibicen (Herbst, 1791)	80-9	9	1
Clibanarius tricolor (Gibbes, 1850)	80-14	13	1
Dardanus insignis (Saussure, 1858)	79-13	281	1
Paguristes inconstans McLaughlin and Provenzano, 1974	80-13	9	1
@ *Paguristes* cf. *lymani* A. Milne Edwards and Bouvier, 1893	78-3; 78-5; 78-8 79-12	408–462	4
Paguristes puncticeps Benedict, 1901	80-7; 80-9	9–14	7
Paguristes spinipes A. Milne Edwards, 1880	79-12; 80-8	299–408	6
Paguristes tortugae Schmitt, 1933	80-5; 80-9	9–14	3
@ *Paguristes* sp. A	80-9; 80-10	9	9
PAGURIDAE			
Iridopagurus reticulatus García-Gómez, 1983	80-7	14	1
Pagurus brevidactylus (Stimpson, 1859)	80-9	9	1
Pagurus provenzanoi Forest and De Saint Laurent, 1968	80-7	14	1
Pagurus stimpsoni (A. Milne Edwards and Bouvier, 1893)	80-7; 80-10	9–14	2
@ *Pylopagurus* cf. *discoidalis* (A. Milne Edwards, 1880)	79-11	431	1
@ *Pylopagurus* sp. A	78-8	453	1
Tomopagurus cubensis (Wass, 1963)	78-8; 79-13	281–453	2
Tomopagurus wassi McLaughlin, 1981	79-?	—	1
Tomopaguropsis problematica (A. Milne Edwards and Bouvier, 1893)	78-8	453	4
PARAPAGURIDAE			
@ *Parapagurus* spp.	78-1; 78-3; 78-5 78-8; 80-3	362–462	50
CHIROSTYLIDAE			
o+ *Chirostylus spinifer* (A. Milne Edwards, 1880)	78-5; 79-12	408–453	2
o+ *Uroptychus uncifer* (A. Milne Edwards, 1880)	78-5; 79-3	428–453	4
GALATHEIDAE			
Munida benedicti Chace, 1942	79-5	254–281	1
o+ *Munida evermanni* Benedict, 1901	79-3; 79-7; 79-12	408–471	5

Table 1. Continued.

Family Genus/species	Station	Depth (m)	Number of specimens
Munida iris A. Milne Edwards, 1880	78-5	453	2
Munida irrasa A. Milne Edwards, 1880	79-5; 79-13	254–281	5
Munida longipes A. Milne Edwards, 1880	78-3; 78-5; 78-8 79-3; 79-11; 79-12	408–462	45
o+ *Munida schroederi* Chace, 1939	78-1; 79-7; 79-11	362–471	12
o+ *Munida stimpsoni* A. Milne Edwards, 1880	79-7	471	1
o *Munidopsis abdominalis* (A. Milne Edwards, 1880)	79-3	428–446	1
o+ *Munidopsis brevimanus* (A. Milne Edwards, 1880)	78-5	453	1
PORCELLANIDAE			
Parapethrolisthes tortugensis (Glassell, 1945)	80-7	14	1
DROMIIDAE			
Hypoconcha sabulosa (Herbst, 1799)	80-7	14	1
DORIPPIDAE			
+ *Cyclodorippe ornata* Chace, 1940	79-11	431	2
CALAPPIDAE			
Acanthocarpus bispinosus A. Milne Edwards, 1880	78-1	362	1
Cycloes bairdi Stimpson, 1860	81-2	13	1
LEUCOSIIDAE			
Iliacantha intermedia Miers, 1886	80-14	13	1
Iliacantha subglobosa Stimpson, 1871	79-13	281	3
MAJIDAE			
o *Anasimus fugax* A. Milne Edwards, 1880	79-13	281	1
Collodes levis Rathbun, 1901	80-7	14	1
Collodes robustus Smith, 1883	79-17	348–420	1
Macrocoeloma diplacanthum (Stimpson, 1860)	80-4	16	1
Macrocoeloma subparallelum (Stimpson, 1860)	79-8	1	1
Macrocoeloma trispinosum trispinosum (Latreille, 1825)	80-7	14	1
Mithrax acuticornis Stimpson, 1871	80-10	9	1
Mithrax cinctimanus (Stimpson, 1860)	81-13	9	1
Mithrax forceps (A. Milne Edwards, 1875)	80-6; 80-7	14	13
Mithrax pleuracanthus Stimpson, 1871	80-7; 80-10	9–14	3
Microphrys antillensis Rathbun, 1920	80-4; 80-13	9–16	2
Myropsis quinquespinosa Stimpson, 1871	79-13	281	1
Podochela curvirostris (A. Milne Edwards, 1879)	79-13; 79-15	281–417	2
Podochela macrodera Stimpson, 1860	80-6; 80-9	9–14	3
Podochela riisei Stimpson, 1860	80-4	16	1
Pyromaia cuspidata Stimpson, 1871	79-13	281	1
Rochinia hystrix (Stimpson, 1871)	78-1; 78-2	362–498	2
Tyche emarginata White, 1847	80-4	16	1
PORTUNIDAE			
Cronius ruber (Lamarck, 1818)	80-10	9	1
Portunus anceps (Saussure, 1858)	80-13	9	3
*o+ *Portunus bahamensis* Rathbun, 1930	80-13; 80-31	9	5
Portunus ordwayi (Stimpson, 1860)	80-7; 80-10; 80-12 80-13; 80-14	9–14	6
Portunus spinicarpus (Stimpson, 1871)	79-7; 79-13	281–471	8
Portunus spinimanus Latreille, 1819	80-12; 80-13	9	10

Table 1. Continued.

Family Genus/species	Station	Depth (m)	Number of specimens
XANTHIDAE			
Domecia acanthophora acanthophora (Desbonne and Schramm, 1867)	80-7	14	1
Glyptoxanthus erosus (Stimpson, 1859)	79-13	281	1
Melybia thalamita Stimpson, 1871	80-4; 80-7	14–16	2
Micropanope pusilla A. Milne Edwards, 1880	80-6	14	2
Paractaea rufopunctata nodosa (Stimpson, 1860)	80-9; 80-10	9	3
Pilumnus floridanus Stimpson, 1871	80-4	16	1
Pilumnus gemmatus Stimpson, 1860	80-5; 80-9	9–14	3
PALICIDAE			
Palicus cursor (A. Milne Edwards, 1880)	79-3	428–446	1
Palicus sica (A. Milne Edwards, 1880)	80-8	299	1
PINNOTHERIDAE			
* *Dissodactylus juvenilis* Bouvier, 1917	79-13	281	3

sented is the portunid crab *Portunus bahamensis* Rathbun, a species presumed to be endemic to the Bahamas (Garth, 1978). An unusually large specimen of the xanthid crab *Glyptoxanthus erosus* (Stimpson) was collected from the Nicholas Channel. Complete synonymies are given for the above mentioned species except for *Ligur ensiferus, Glyptoxanthus erosus,* and *Micropanope pusilla* where only abbreviated synonymies are included.

A number of minor range extensions are reported for several species listed in Table 1 but not included in the Systematic Account. These are: *Solenocera necopina* Burkenroad, reported for the first time south of Florida; *Automate rectifrons* Chace, known only from Yucatan and questionably Antigua Island, Lesser Antilles; *Synalpheus obtusifrons* Chace, known only from Yucatan (Chace, 1972); and *Collodes levis* Rathbun, known only from Puerto Rico. In the section under Problem Species a number of taxa are discussed that could not be positively identified to specific rank. Mention is made in this section of several new species present in the collection that are in the process of being described by other investigators. The collection has been deposited in the Florida International University Museum.

The Study Area

Cay Sal Bank is 105 × 66 km in its greatest dimensions and occupies an ovotriangular area of about 4,000 km^2. The bank is located south of the Florida Keys, 54 km north of Cuba and 50 km west of the Great Bahama Bank (Fig. 1). The platform of the bank has a maximum depth of 16 m. Scattered groups of islands are located near the edge of the bank and three deep channels surround the platform: Straits of Florida, Santaren and Nicholas channels. Surface currents in these channels flow northwesterly and westerly, respectively, and join the Florida Current. Annual range of surface salinity is 36.00–36.32‰, and of surface temperature is 24.4–28.9°C, giving the bank both a tropical and oceanic character. Marine grasses and calcareous algae constitute the principal shallow-bottom com-

munities. Small patch reefs are present on the southeastern quadrant of the bank. The upper slope is precipitous and largely coralline (Goldberg, 1983).

Materials and Methods

Collecting stations were located in depths ranging from 1 to 498 m and sampling was conducted with either a 30 ft otter trawl (OT) or a Capetown dredge (CD). Duration of tows in shallow water was 20–30 min with the otter trawl and 5–20 min with the Capetown dredge. Some hand collecting was done by snorkeling near some of the islands. On the upper slope, otter trawl tows were made for 45–120 min and Capetown dredge tows for 30–60 min. Stations where decapods were recovered are shown in Fig. 1. For the Brachyura, measurements are reported in this sequence: greatest carapace length by greatest carapace width. The following abbreviations are used: CL = carapace length excluding rostrum, measured from posterior dorsal margin of carapace to posterior margin of orbit; RL = rostral length, measured from posterior margin of orbit to tip of rostrum; FSBC I = Florida Department of Natural Resources, Bureau of Marine Research, St. Petersburg, Florida; MCZ = Museum of Comparative Zoology, Harvard University; UMML = Rosenstiel School of Marine and Atmospheric Science (University of Miami Marine Laboratory).

Systematic Account

Infraorder Caridea Dana
Family Stylodactylidae Bate
Stylodactylus rectirostris A. Milne Edwards, 1883
Figs. 2, 3

Stylodactylus rectirostris A. Milne Edwards, 1883: fig. 35.—Hayashi and Miyake, 1968: 583.—Chace, 1983: 11.

Material Examined.—1 ♂, CL = 11.0 mm, RL = 10.5 mm; north of Muertos Cays; R/V *Bellows*, station 78-1 (CD); 362 m.

Description.—Rostrum horizontal, subequal in length to carapace; armed dorsally and ventrally with movable spines more closely spaced dorsally. Rostral formula 23/8 with 7 postorbital spines. Carapace finely pubescent on orbital and antennal regions; hepatic region triangular, depressed; gastric and cardiac regions separated by weak carina. Carapace with subequal supraorbital and branchiostegal spines, antennal spine reaching midlength of ocular peduncle, and small pterygostomian spine. Ventrolateral margin of carapace with submarginal carina parallel to ventral and posterolateral margins. Eyes with cornea dilated; ocular peduncles narrower basally, slightly longer than cornea.

Abdomen with rounded pleura. Sixth abdominal somite with 1 small spine at dorsolateral angle. Posteroventral margin of first and second abdominal somites each with pair of parallel blunt spines directed posteroventrally. Telson triangular, about 1.5 times as long as sixth abdominal somite, posterior margin ending subtriangularly and with 3 pairs of movable spines: 1 small pair inserted on lateral margin of tip dorsal to 2 pairs of longer spines; longest pair of movable spines nearly twice as long as median pair (Fig. 2B). Dorsal surface of telson with slight median longitudinal depression; with 4 pairs of movable spines, anterior 2 pairs closer together than posterior 2 pairs. Uropods rounded, setose; exopod and endopod subequal in length; exopod with movable spine between fixed distolateral spine and margin of blade.

Antennular peduncle with slender stylocerite extending to midlength of second antennular segment. Lateral antennular flagellum slender, broadest in proximal half and with tufts of setae. Antennal scale exceeding antennular peduncle, curved laterally; lateral margin terminating in spine; proximal half with 3 small spines and 2 or 3 spinules; mesial margin setose. Basal antennal segment unarmed, with 2 rounded lobes ventrally (Fig. 2C).

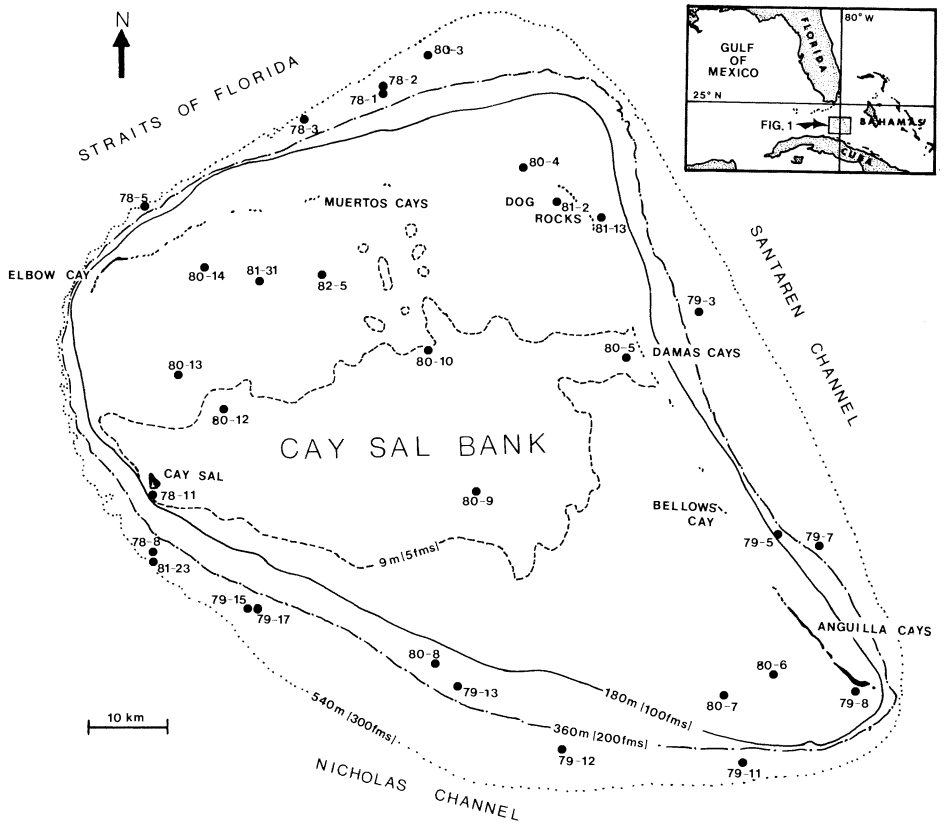

Fig. 1. Study area showing location of stations, coded by year of collection and station number, where decapods were recovered. [Adapted from Malloy and Hurley (1970) and Goldberg (1983)].

Mandible with 2-segmented palp, proximal segment about 1.5 times as long as distal; incisor process with irregular teeth; incisor and molar processes more or less contiguous. Maxillule with endopod weakly bilobed distally; base of endopod and proximal endite similar in width. Maxilla with slender endopod reaching midlength of distal endite. First maxilliped with endopod of 3 segments with first and third segments much shorter than second; exopods elongated, subdivided on distal half, with rounded lobe; with bilobed epipod. Second maxilliped with last 2 segments of endopod placed side by side on distal margin of antepenultimate segment; coxa with elongated exopod subdivided on distal third, with podobranch (not shown in Fig. 2J). Third maxilliped long, slender, exceeding tip of rostrum by slightly more than length of ultimate segment.

First and second pereiopods similar, elongate, chelate, and with long plumose setae on ventral margins of segments. Merus with irregular rows of spinules on lateral surface, with several strong spines on ventral and distal margin; carpus with irregular rows of spinules on lateral surface. Chela long, about 1.3 times as long as carpus, palm extremely reduced; fingers subcylindrical, with long plumose setae on ventral margins. Third to fifth pereiopods similar. Merus with plumose setae on ventral and dorsal margin, with row of strong spines on ventral margin and 2 strong spines on distal margin; carpus with curved blunt spine on dorsodistal

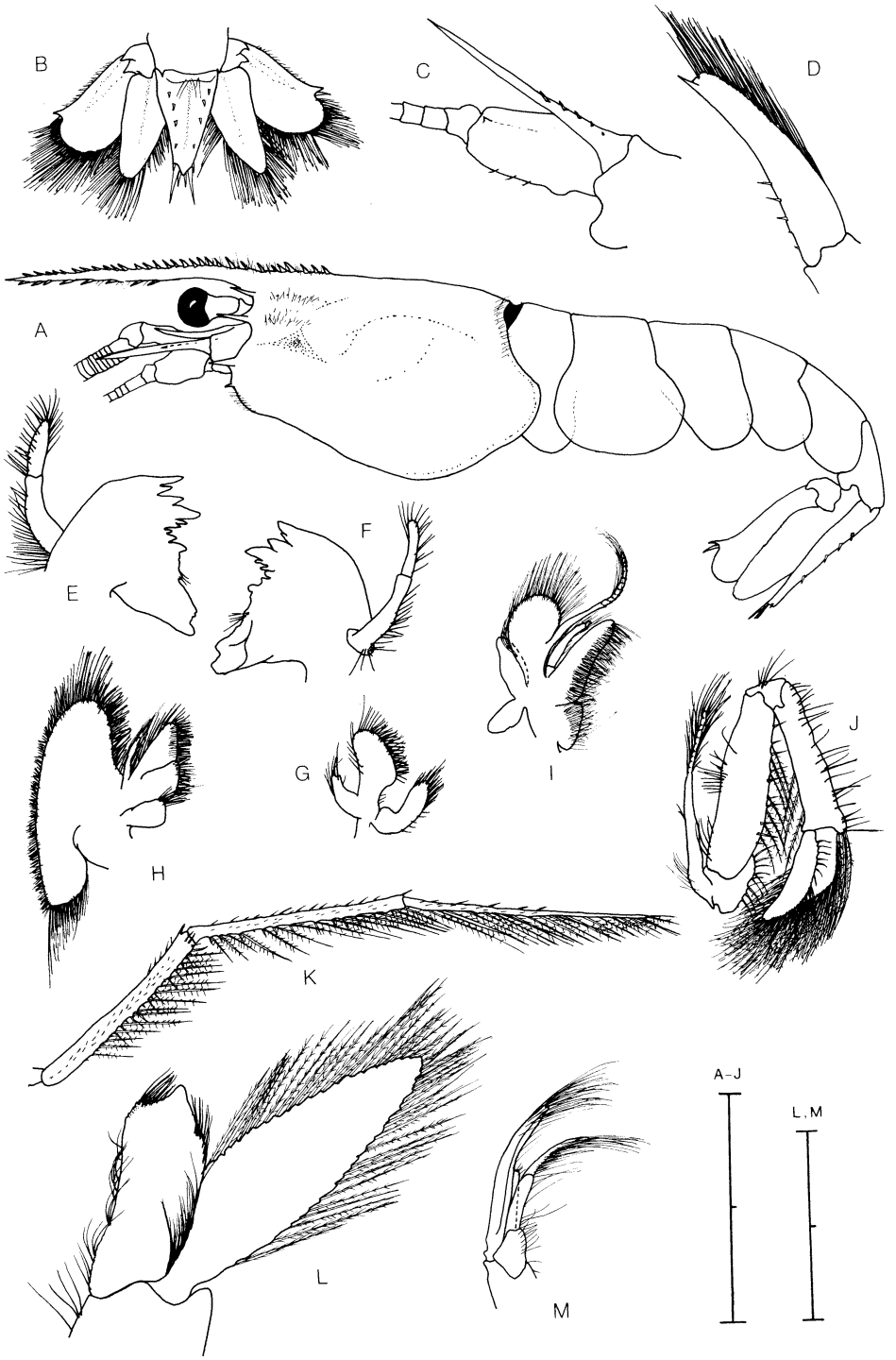

Fig. 2. *Stylodactylus rectirostris* A. Milne Edwards. A, whole animal with ambulatory appendages removed; B, telson and uropods (dorsal view); C, antennal peduncle, setae omitted (left, lateral view);

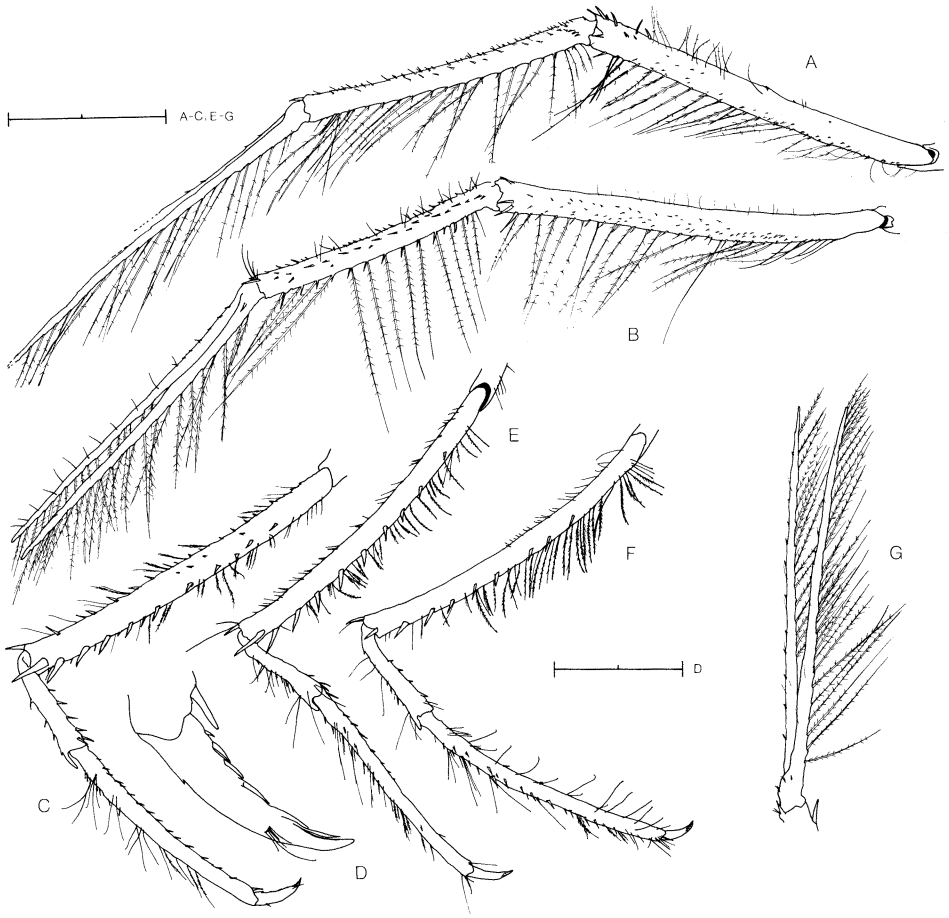

Fig. 3. *Stylodactylus rectirostris* A. Milne Edwards. A–G, pereiopods (left, lateral view): A, first pereiopod (dactyl damaged); B, second pereiopod; C, third pereiopod; D, dactyl of same; E, fourth pereiopod; F, fifth pereiopod; G, chela of right first pereiopod (lateral view). Scales equal 5 mm (A–C, E–G), 1 mm (D).

margin; propodus with row of spinules on proximal third to entire length of ventral and dorsal margin, about 4.4 times as long as dactyl in third pereiopod, about 4.8 times as long as dactyl in fourth pereiopod, and about 7 times as long as dactyl in fifth pereiopod; dactyl small, curved, with 5 or 6 corneous spinules on ventral margin.

Endopod of first pleopod in male with blunt triangular tip; distomesial margin with minute spinules. Appendix interna and appendix masculina subequal in length.

←

D, antennal scale (left, dorsal view); E, mandible (left, external view); F, mandible (left, internal view); G–K, mouthparts (left, external view); G, maxillule; H, maxilla; I, first maxilliped; J, second maxilliped; K, third maxilliped; L, first pleopod (left, posterior view); M, second pleopod (left, mesial view). Scales equal 10 mm (A, B, K), 5 mm (C–J), 2 mm (L, M).

Branchial formula:

	maxilliped			pereiopod				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	2	1	1	1	1	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	—	—	—	—	—	—
Exopods	1	1	—	—	—	—	—	—

Range.—Western Atlantic: Cay Sal Bank, Bahamas; St. Lucia, Lesser Antilles; 131–364 m.

Remarks.—*Stylodactylus rectirostris* was only figured by A. Milne Edwards (1883). This specimen from Cay Sal Bank, the second reported, is fully described for the first time. After A. Milne Edwards figured *S. rectirostris,* this species has been mentioned only by Hayashi and Miyake (1968) and by Chace (1983). Hayashi and Miyake referred only briefly to this species without specifying its diagnostic characters. In a study of the Stylodactylidae from the Philippines, Chace included *S. rectirostris* in a key. In the same study, Chace described a new species from Indonesia, *S. libratus,* and remarked on the similarity of his new taxon with *S. rectirostris.*

The genus *Stylodactylus* is represented in the western Atlantic by two species, *S. rectirostris* and *S. serratus* A. Milne Edwards, 1881. The two species can be separated by the armature of the rostrum and the antennal scale. *Stylodactylus rectirostris* has a straight horizontal rostrum with 30 or 31 movable spines dorsally and 7 or 8 movable spines ventrally, whereas *S. serratus* has an upwardly curved rostrum with 37–40 movable spines dorsally and more than 20 spines ventrally (A. Milne Edwards, 1881, 1883). The lateral margin of the antennal scale of *S. rectirostris* has several spines and spinules, whereas the antennal scale of *S. serratus* is unarmed.

Family Hippolytidae Dana
Ligur ensiferus (Risso, 1816)
Figs. 4, 5

Ligur Edwardsi: Senna, 1902: 321, fig. 6; pl. 17, figs. 1–17.
Ligur edwardsii: Gordon, 1936: 107, fig. 2.
Ligur ensiferus: Holthuis, 1955: 97, fig. 66b.—Zariquiey-Alvarez, 1968: 133, figs. 1b, 4e, 10b, 52e, 57, 58.—Crosnier and Forest, 1973: 175, fig. 54.

Material Examined.—1 ♀, CL = 15.0 mm, RL = 14.0 mm; northeast of Elbow Cay; R/V *Bellows,* station 78-5 (OT); 453 m.

Diagnosis.—Rostrum horizontal, laterally compressed; armed dorsally with 3 sharp evenly spaced teeth forwardly directed; 1 postrostral tooth. Postrostral carina extending beyond midlength of carapace. Carapace smooth; anterolateral margin with suborbital and branchiostegal spine each with carina extending posteriorly; anteroventral angle rounded. Posterior margin of telson subtriangular, with 3 pairs of movable spines (Fig. 4K). Dorsal surface of telson with shallow median longitudinal groove, posterior half with 2 pairs of minute movable spines. Lateral margin of exopod without setae. Exopod with movable spine between fixed distolateral spine and blade margin. Antennular peduncle with curved stylocerite, terminating in spine, and with rounded lobe at laterobasal margin. Antennular and antennal flagella exceeding body length. Basal segment of antennal peduncle

armed with lateral spine directed slightly ventrally; antennal scale exceeding antennular peduncle by about half its own length. Second pereiopod unarmed, ending in minute chela; ischium with 5 small articles in distal third, 1 long article proximally; merus subdivided into 33 articles; carpus subdivided into 45 articles. Mouthparts as figured.

Branchial formula:

	maxilliped			pereiopod				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	2	1	1	1	1	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	1	1	1	1	1	—
Exopods	1	1	1	—	—	—	—	—

Range.—Maldive Islands, Indian Ocean; eastern Mediterranean; eastern Atlantic: Cape Verde and Senegal; western Atlantic: Cay Sal Bank, Bahamas; 300–860 m.

Remarks.—The genus *Ligur* presently contains two species, *L. ensiferus* and *L. uveae* (Borradaile, 1899), the latter a shallow-water species found in land-locked pools of salt water in the Indo-West Pacific (Gordon, 1936; Holthuis, 1963). Until Crosnier and Forest (1973) reported *L. ensiferus* from the eastern Atlantic this species was known only from the Mediterranean Sea and the Maldive Islands. The discovery of *L. ensiferus* in the western Atlantic represents a considerable range extension for this species.

Family Pandalidae Dana
Plesionika williamsi Forest, 1963

Plesionika williamsi Forest, 1963: 621, figs. 1–4.—Williams, 1968: 105.—Crosnier and Forest, 1973: 211, fig. 65e.—Holthuis, 1980: 147.

Material Examined.—1 ♀ (damaged), CL = 16.0 mm; northeast of Elbow Cay; R/V *Bellows,* station 78-5 (OT); 453 m.—1 ♂, CL = 16.5 mm, RL = 32.0 mm; south of Cay Sal; R/V *Bellows,* station 81-23 (OT); 471 m.

Additional Material.—1 ♂, CL = 25.5 mm, RL = 37.1 mm; "eastern Gulf of Mexico, between Boca Grande, Lee County, Florida to Mississippi River"; trawler M/V *Libra*; 402.3–548.6 m; FSBC I 29934 (see Remarks).

Supplemental Diagnosis.—Branchial formula:

	maxilliped			pereiopod				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	2	1	1	1	1	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	1	1	1	1	1	—
Exopods	1	1	1	—	—	—	—	—

Range.—Eastern Atlantic: Guinea and Ivory Coast; western Atlantic: eastern Gulf of Mexico and Cay Sal Bank, Bahamas; 300–471 m.

Remarks.—The presence of *P. williamsi* in the Gulf of Mexico and at Cay Sal Bank represents a considerable extension of the range of the species which was known previously only from the eastern Atlantic region. The specimen of *P. williamsi* reported from the Gulf of Mexico was captured by a shrimp trawler

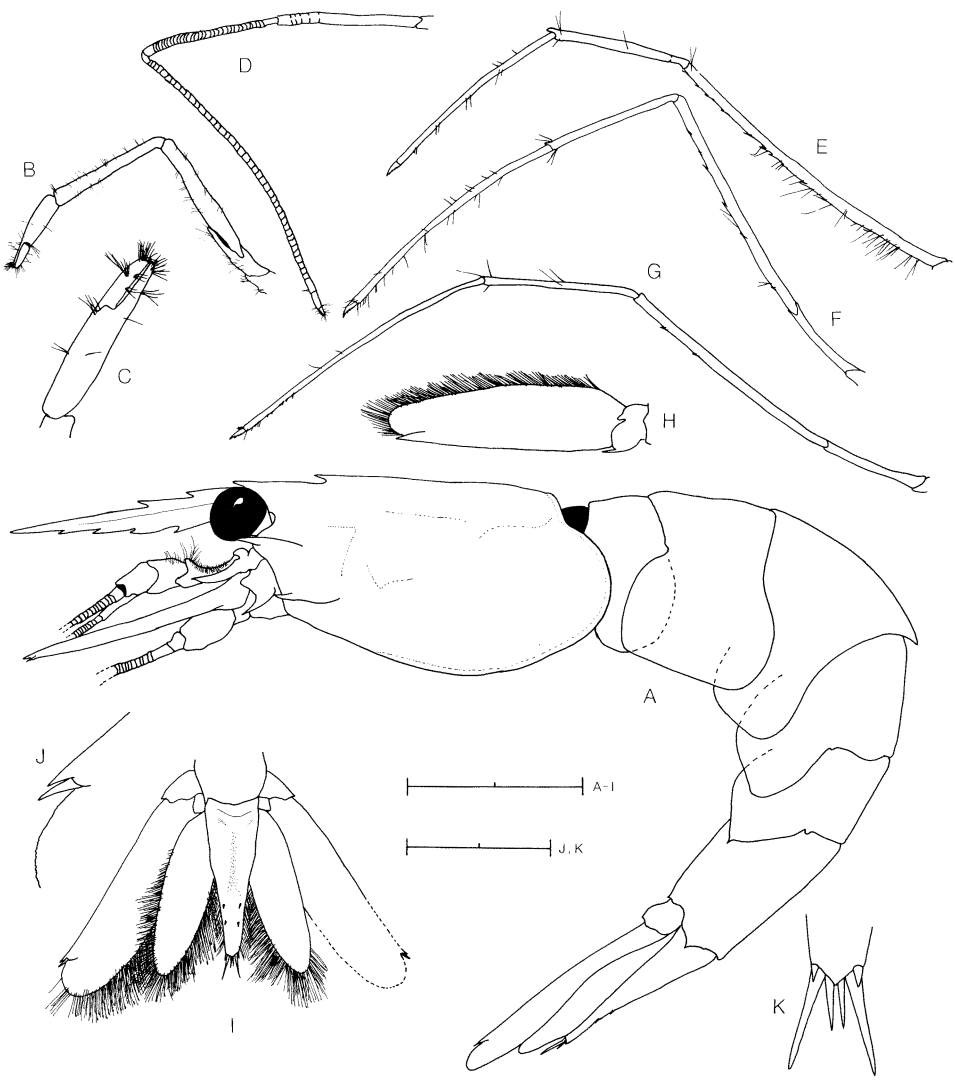

Fig. 4. *Ligur ensiferus* (Risso). Female. A, whole animal with ambulatory appendages removed; B–G, pereiopods (left, lateral view): B, first pereiopod; C, chela of same in dorsal view; D, second pereiopod; E, third pereiopod; F, fourth pereiopod; G, fifth pereiopod; H, antennal scale (left, dorsal view); I–K, telson and uropods (dorsal view): I, telson and uropods; J, spines of left exopod; K, tip of telson. Scales equal 10 mm (A, B, D–I), 5 mm (C), 2 mm (J, K).

during a fishing trip from Boca Grande, Lee County, Florida, to Mississipi, and donated to the FSBC I. The precise location of the capture of this specimen in the eastern Gulf of Mexico unfortunately is unknown. In the eastern Atlantic, *P. williamsi* is abundant and of potential commercial importance (Forest, 1963). *Plesionika williamsi* can be easily separated from other *Plesionika* species by the presence in this species of four pairs of spines on the dorsal surface of the telson, and the presence of an epipodite on the fourth pereiopod.

Family Alpheidae Rafinesque
Synalpheus dominicensis Armstrong, 1949

Synalpheus dominicensis Armstrong, 1949: 23, fig. 8.—Chace, 1972: 92.

Material Examined.—2 ♀♀ (1 ovigerous), CL = 2.5–3.1 mm, RL = 0.5–0.6 mm; west of Damas Cays; R/V *Bellows,* station 80-5 (CD); 14 m.—1 ♀, CL = 1.8 mm, RL = 0.6 mm; southwest of Anguilla Cays; R/V *Bellows,* station 80-7 (CD); 14 m.

Remarks.—Previously *S. dominicensis* was known from only two specimens collected at Barahona Harbor, Dominican Republic, in 3.6–7.2 m depth (Armstrong, 1949). *Synalpheus dominicensis* can be distinguished from other western Atlantic species of *Synalpheus* by the presence of a row of movable spines on the distal half of the ventral margin of the merus of the third pereiopod.

Infraorder Brachyura Latreille
Family Portunidae Rafinesque
Portunus bahamensis Rathbun, 1930
Fig. 6A

Portunus bahamensis Rathbun, 1930: 90, pls. 42, 43.—Stephenson *et al.,* 1968: 12.—Garth, 1978: 323.

Material Examined.—2 ♂♂, 1 ♀, 18 × 27.7 to 26.2 × 40.3 mm; northeast of Cay Sal; R/V *Bellows,* station 80-13 (OT); 9 m.—1 ♂, 1 ♀, 15.8 × 23.4 to 18.2 × 27.3 mm; south of Water Cay; R/V *Bellows,* station 80-31 (CD); 9 m.

Range.—Western Atlantic: Bahamas, from Cat Key to Cay Sal Bank; 1–11.5 m.

Remarks.—Since Rathbun's (1930) description, this species has been mentioned by Stephenson *et al.* (1968) who used only part of Rathbun's material. Garth (1978) reported *P. bahamensis* for the second time and considered it to be endemic to the Bahamas. The specimens used by Rathbun, as well as those reported by Garth, came from a restricted area in the main Bahamian group of islands: New Providence Islands, Eleuthera Island, and Cat Key. The presence of *P. bahamensis* in Cay Sal Bank, outside the main Bahamian group of islands, may indicate the possibility that this species may have a broader distribution than previously believed.

Family Xanthidae Macleay
Glyptoxanthus erosus (Stimpson, 1859)
Fig. 6B, C

Glyptoxanthus erosus: Rathbun, 1930: 263, pl. 107.—Williams, 1965: 185, figs. 167, 183A.—Guinot, 1967b: 551, figs. 21, 30.

Material Examined.—1 ♂, 55.2 × 77.5 mm; Nicholas Channel; R/V *Bellows,* station 79-13 (OT); 281 m.

Range.—Western Atlantic: North Carolina and Gulf of Mexico to Guadeloupe, Lesser Antilles; low tide mark to 281 m.

Remarks.—The specimen collected in Nicholas Channel is unusually large. Previously, the largest size reported was 39 × 54 mm for a male (Williams, 1965). Reports of this species have been based on specimens much smaller than the one reported herein; however, specimens even larger (up to 59.2 × 82.9 mm) than the one from the Nicholas Channel have been found on the North Carolina coast in depths less than 30 m (Schwartz, personal communication).

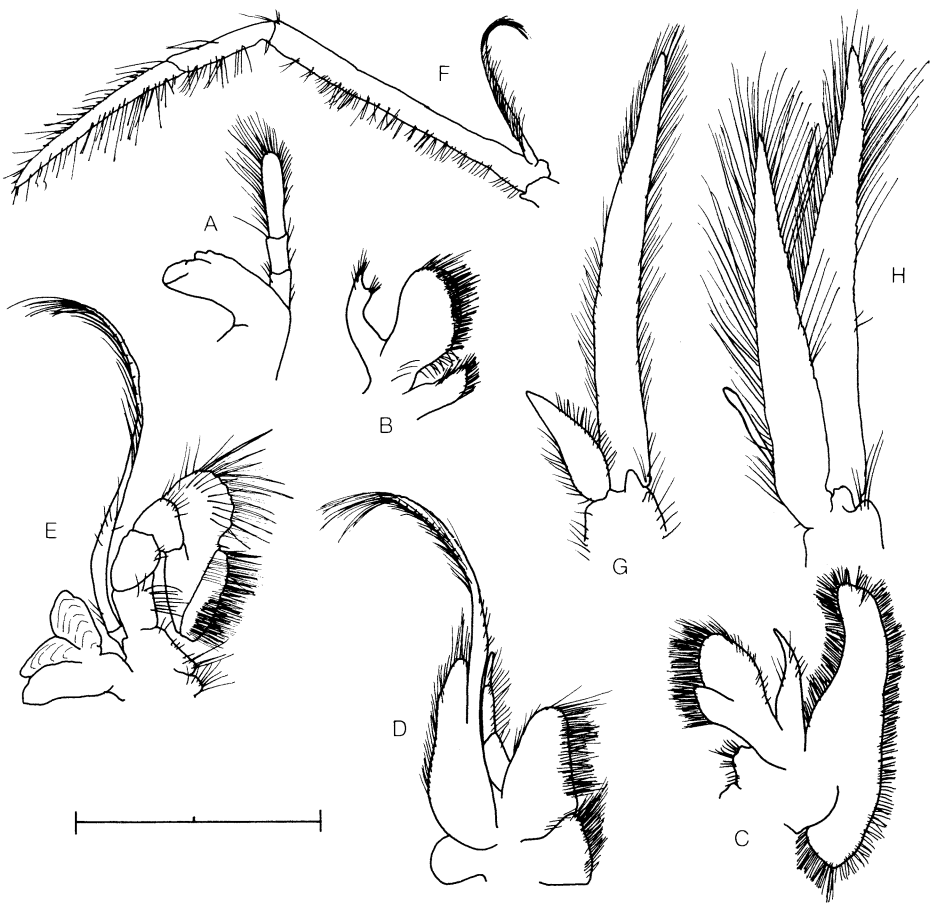

Fig. 5. *Ligur ensiferus* (Risso). Female. A, mandible (internal view); B–F, mouthparts (external view): B, maxillule; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped; G, H, first and second pleopods (left, posterior view): G, first pleopod; H, second pleopod. Scale equals 10 mm (A–D), 5 mm (E–H).

Micropanope pusilla A. Milne Edwards, 1880
Figs. 7, 8A–C

Micropanope pusilla: Rathbun, 1930: 431, pl. 179, figs. 7, 8.

Material Examined.—1 ♂, 1 ovigerous ♀, 3.2 × 3.9 to 2.8 × 3.6 mm; south of Anguilla Cays; R/V *Bellows,* station 80-6 (CD); 14 m.

Diagnosis.—Carapace broader than long, with numerous minute granules; regions

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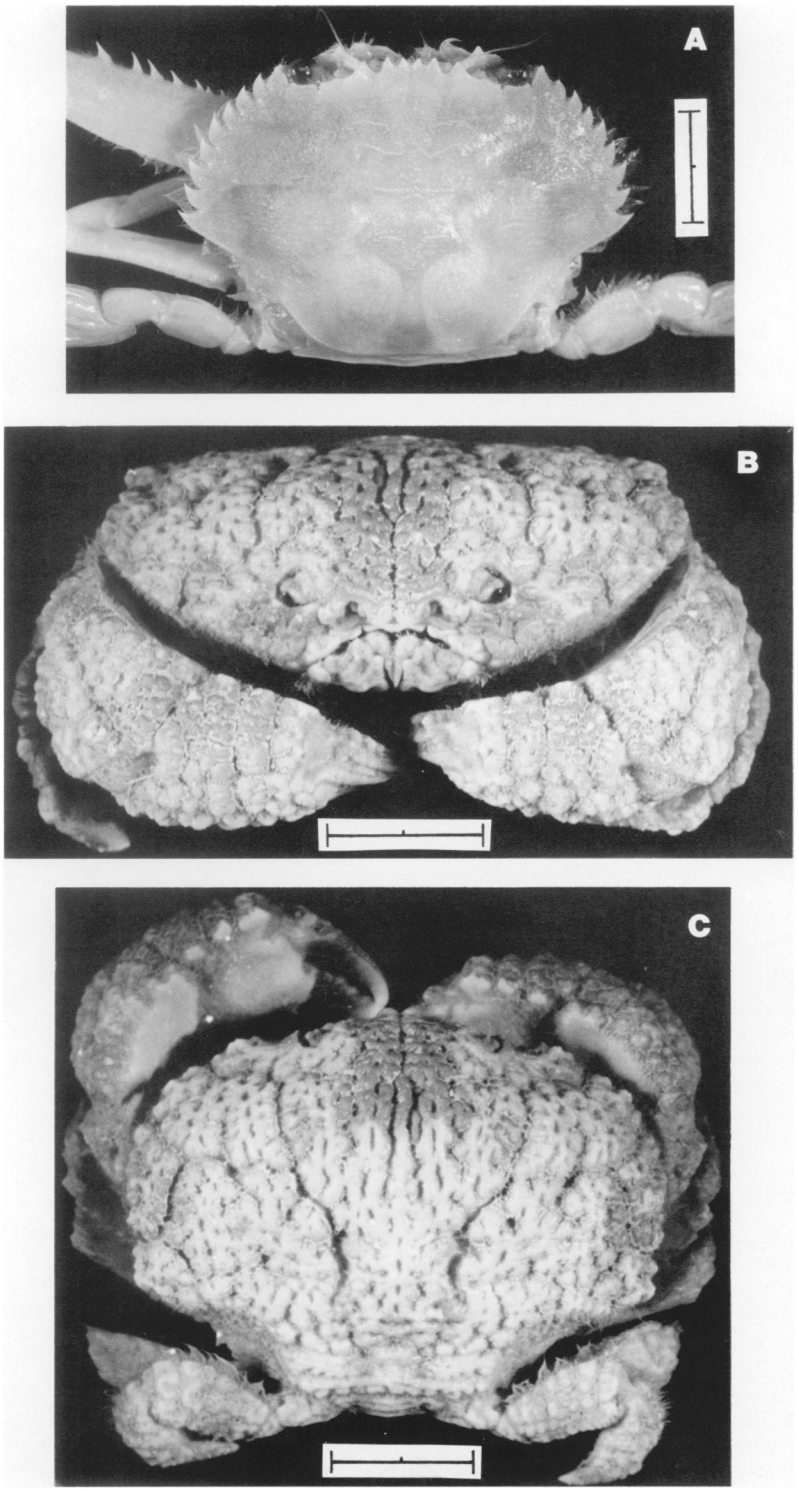
Fig. 6. A, *Portunus bahamensis* Rathbun, male, dorsal view; B, C, *Glyptoxanthus erosus* (Stimpson), male: B, frontal view; C, dorsal view. Scales equal 10 mm (A), 20 mm (B, C).


A
B
C

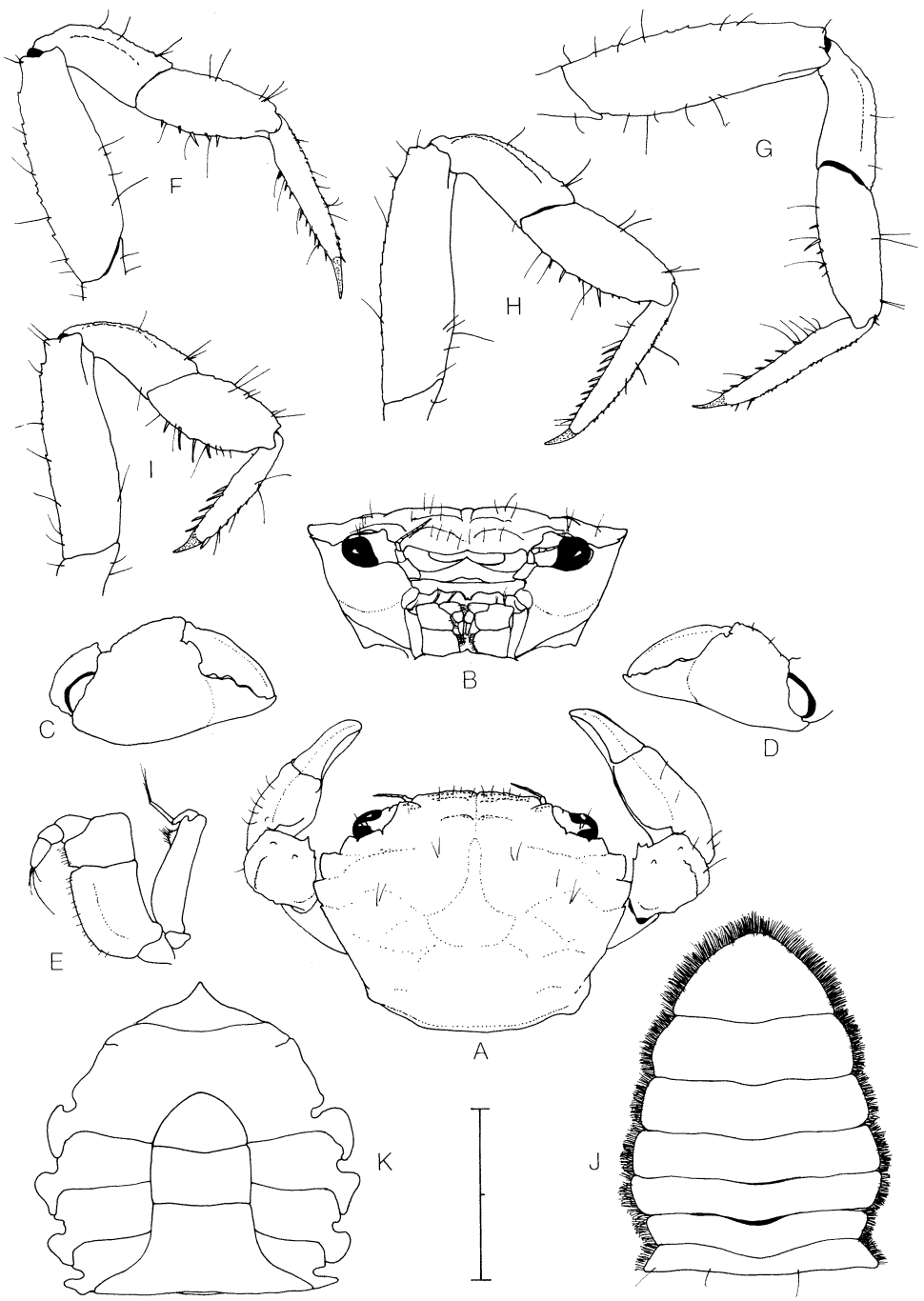


Fig. 7. *Micropanope pusilla* A. Milne Edwards. A–I, ovigerous female: A, cephalothorax and chelipeds; B, frontal view of cephalothorax; C, right chela (lateral view); D, left chela (lateral view); E, third maxilliped (left, external view); F–I, right ambulatory legs (pereiopods 2–5, lateral view): F, first leg; G, second leg; H, third leg; I, fourth leg; J, female abdomen; K, male abdomen and sternum. Scale equals 2 mm (A–D), 1 mm (E–K).

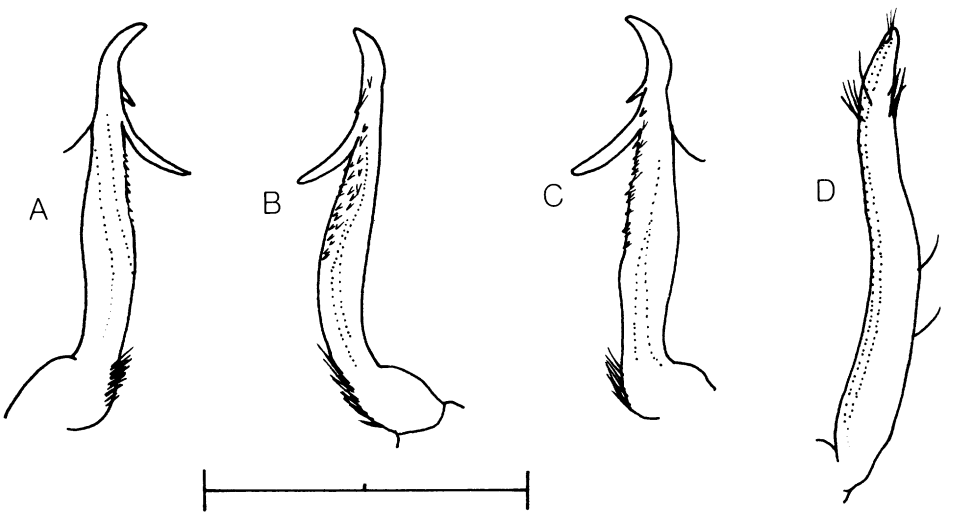


Fig. 8. Male right gonopod (first pleopod). A–C, *Micropanope pusilla* A. Milne Edwards: A, posterior view; B, mesiolateral view; C, anterior view; D, *Dissodactylus juvenilis* Bouvier, posterior view. Scale equals 1 mm.

distinctly marked. Frontal margin divided into 2 lobes by V-shaped notch; frontal region with transverse row of setae. Orbits large, with 2 fissures on dorsal margin; suborbital margin nearly straight, terminating mesially in triangular lobe. Anterolateral margin 4-toothed as result of fusion of first (outer orbital) and second teeth; third tooth largest; fifth tooth minute, formed by small indentation at base of fourth tooth. Chelipeds unequal, granulose as on carapace but with smaller granules; carpus with 1–3 spines on inner margin, and transverse granular ridge on distal third of dorsal surface; palm smooth on outer surface, proximal inner dorsal margin produced in rounded lobe. Merus of ambulatory legs armed with small spines on dorsal margin; carpus with longitudinal granular ridge on upper half of posterolateral surface; ventral margin of propodus and dactyl armed with corneous spinules. Female abdomen with 6 somites and distinct subtriangular telson. Male with 4-segmented abdomen resulting from fusion of somites 3–5 and telson. Male gonopods (first pleopods) each with strong long spine directed posteriorly on distal third of mesial margin (Fig. 8A–C).

Range.—Western Atlantic: eastern Gulf of Mexico; Cay Sal Bank, Bahamas; north coast of Cuba; Jamaica; Puerto Rico; Virgin Islands; 14-311 m.

Remarks.—Guinot (1967a, 1968) restricted the genus *Micropanope* Stimpson to the species *M. sculptipes* Stimpson, 1871, and *M. lobifrons* A. Milne Edwards, 1880, and reassigned most of the remaining species to four new genera: *Gonopanope, Coralliope, Nanocassiope,* and *Microcassiope.* However, Guinot did not assign *M. pusilla* to any of these genera. The morphology of *M. pusilla* does not fit any of the genera proposed by that author. Guinot's division of *Micropanope* sensu lato was based primarily on gonopod morphology. The gonopods of *M. pusilla* are markedly different from those of species of *Micropanope* sensu stricto and from those of species of Guinot's genera. The presence in *M. pusilla* of a long spine on the mesial margin of each gonopod (first pleopod) clearly sets this species apart. As Williams (1978) has pointed out, there is insufficient knowledge of

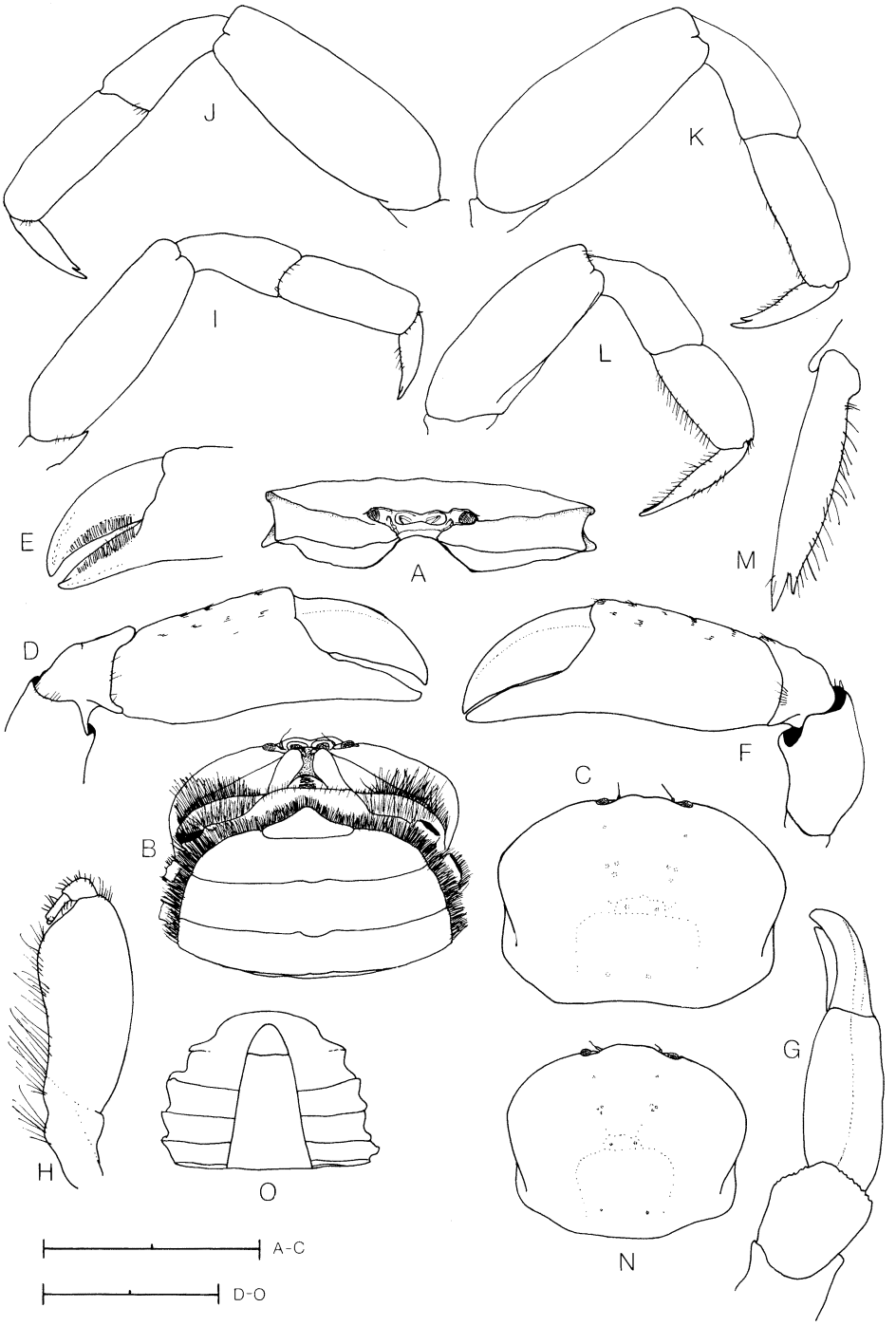


Fig. 9. *Dissodactylus juvenilis* Bouvier. A–M, ovigerous female: A, cephalothorax (frontal view); B, abdomen; C, cephalothorax (dorsal view); D, right cheliped (lateral view); E, extremity of same cheliped (mesial view); F, left cheliped (lateral view); G, same cheliped (dorsal view); H, third maxilliped (left,

intrageneric variation of gonopods in the Xanthidae to justify a new genus for *M. pusilla* at this time. Until a full revision of *Micropanope* in particular, and the Xanthidae in general, is completed, *M. pusilla* must remain in *Micropanope* sensu lato.

Family Pinnotheridae de Haan
Dissodactylus juvenilis Bouvier, 1917
Figs. 8D, 9

Dissodactylus juvenilis Bouvier, 1917: 397.—A. Milne Edwards and Bouvier, 1923: 349, figs. 11, 12; pl. 9, figs. 3, 4.—Schmitt *et al.*, 1973: 17.

Lectotype (herein designated).—Ovigerous ♀, 7 × 9.5 mm; north of Yucatan (23°13'N, 89°16'W); *Blake* station 36, 1877–78; 153.4 m; MCZ 9156.

Additional Material Examined.—1 ♂, 1 ovigerous ♀, 3 × 5.3 to 2.3 × 7.4 mm; Nicholas Channel; R/V *Bellows*, station 79-13 (OT); 281 m.

Diagnosis of Female.—Carapace flat, smooth, shiny, slightly depressed on intestinal region; dorsal surface lacking ridges; with sharp-edged anterolateral and posterolateral margins. Frontal region divided into 2 rounded lobes by shallow sinus. Lower margin of pterygostomian region with row of long setae visible in dorsal view. Anterior margin of first thoracic sternite divided into 2 small lobes. Third maxilliped with ischium and merus fused; palp small, 3-segmented, inserted in groove on antero-internal angle of merus; carpus subrectangular; propodus elongated; dactyl minute, inserted on internal face of propodus. Chelipeds subequal, compressed laterally; carpus with dorsodistal margin serrate; palm with scattered rows of tufts of minute setae on upper half of external surface. Ambulatory legs compressed laterally; meri flat, each with sharp longitudinal ridge on dorsal margin continued on carpus, propodus, and dactyl; dactyls bifurcated distally, tips subparallel; flexor margins of dactyls with sparse setae and minute spinules. Female abdomen covering thoracic sternites 4–8, all somites distinct, telson subtriangular.

Diagnosis of Male.—Similar to female but smaller in size. Abdomen with somites 2–6 fused, telson subtriangular with rounded apex. Gonopods (first pleopods) sinuous, simple; distal portions with sparse setae (Fig. 8D).

Range.—Western Atlantic: north of Yucatan in the Gulf of Mexico; Cay Sal Bank, Bahamas; 153.4–281 m.

Remarks.—Bouvier's (1917) description of *D. juvenilis* was based on two incomplete female specimens and lacked figures. Subsequently, A. Milne Edwards and Bouvier (1923) figured and republished Bouvier's description of this species. One of Bouvier's specimens, lacking all appendages except the left fourth pereiopod, was deposited in the MCZ. The remaining specimen, lacking all appendages, was deposited in the Muséum National d'Histoire Naturelle, Paris (Schmitt *et al.*, 1973). I have examined the MCZ paratype and have found that it agrees completely with the specimens from Nicholas Channel. Because I have found inaccuracies both in the original description and in A. Milne Edwards and Bouvier's

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external view); I–M, ambulatory legs (pereiopods 2–5, lateral view): I, first right; J, second left; K, third right; L, fourth right; M, dactyl of same in dorsal view; N–O, male: N, cephalothorax (dorsal view); O, abdomen and sternum. Scales equal 5 mm (A–C), 2 mm (D–G, I–L, N, O), 1 mm (H, M).

figures, I have designated the MCZ paratype as the lectotype of this species. Bouvier implied that *D. juvenilis* lacked a palp on the third maxilliped, and A. Milne Edwards and Bouvier depicted this same condition. However, a palp is present in the lectotype as well as in the material from Nicholas Channel. Although A. Milne Edwards and Bouvier's figure of *D. juvenilis* shows transverse dorsolateral ridges on the carapace, these ridges are not present in any of the material examined. Their absence in *D. juvenilis* sets this species apart from the other species of *Dissodactylus*.

Most species of *Dissodactylus* are commensal with, or parasitic upon, echinoids (Telford, 1982). However, it was not possible to determine if the specimens examined had been associated with any host.

Problem Species

Family Penaeidae Rafinesque
Metapenaeopsis cf. *goodei* (Smith, 1885)

Remarks.—According to Pérez-Farfante (1971), *M. goodei* is closely related to *M. martinella* Pérez-Farfante, 1971. The two species can be distinguished by the morphology of the petasma and the thelycum. The thelyca of the 12 female specimens of *M.* cf. *goodei* collected at Cay Sal Bank show a range of variation between *M. goodei* and *M. martinella*. On the basis of female characters it is not possible to determine whether the specimens represent one or the other species. However, as all eight males collected have petasmas as described for *M. goodei*, with the right distoventral projection having the right lobe larger than the left, the material is referred to *M.* cf. *goodei*.

Family Pandalidae Haworth
Parapandalus sp.

Remarks.—The only specimen obtained of *Parapandalus* sp. is a damaged ovigerous female (CL = 13.2 mm) lacking part of the rostrum, the third and fourth pereiopods, and parts of the remaining pereiopods. Because of the condition of the specimen it has not been possible to determine its identity.

Superfamily Paguroidea Latreille

Remarks.—Among the Diogenidae collected, *Paguristes* cf. *lymani* A. Milne Edwards and Bouvier, 1893, and *Paguristes* sp. A, represent taxa of a species complex still being reviewed (McLaughlin, in preparation).

The Paguridae material from the Bank contains *Pylopagurus* cf. *discoidalis* (A. Milne Edwards, 1880) and *Pylopagurus* sp. A, taxa that are included in the revision of *Pylopagurus* and *Tomopagurus* (McLaughlin, 1981, and in preparation).

The Parapaguridae are among the most abundant species on the slopes of Cay Sal Bank. The collection contains several taxa reported herein as *Parapagurus* spp. These specimens could not be positively identified to specific rank because of the state of taxonomic confusion that exists among species of this genus. A study of the systematics of *Parapagurus* is in progress at the present time (Lemaitre, in preparation). (In a recent review of hermit crab phylogeny (McLaughlin, 1983) all six families have been reunited under the Superfamily Paguroidea.)

Zoogeographic Affinities

A zoogeographic evaluation of the decapod fauna from the Antilles and Bahamas region at the present time can only be tentative at best because of the paucity of distributional information on many species. However, based on the geographic distribution of the species found at Cay Sal Bank some general observations can be made on their zoogeographic affinities. The bank is positioned along the southern margin of the Florida Current, and represents the first possible "stepping-stone" (excluding the northwest coast of Cuba) that can be encountered by larval stages being transported by this powerful current system. Knowledge of the geographic distribution of the species inhabiting the bank can thus provide an indication of the influence of the Florida Current on the composition of its fauna.

The Florida Current has been cited by Briggs (1974) as one of the main zoogeographic barriers separating a West Indian Faunal Province (Bahamas, Antilles, and Bermuda) from a Caribbean Province (southern Florida; and Central America and northern South America, from Cape Rojo, Mexico, to eastern Venezuela). However, such a faunal division does not seem to be justifiable, at least for decapod crustaceans. The examination of the geographic distribution of the species from Cay Sal Bank indicates that the decapod fauna from the bank is largely composed of species with a distribution that includes continental waters of North America. Of the species found on the bank, 90 (84%) are also found in continental waters of North America, whereas only 10 species (9%) are known only from the Antilles and/or Bahamas region (Table 1). These latter species, however, have seldom been reported, and it is likely that future sampling will show that these too have broader distributions. Thus, this Western Boundary Current does not appear to be an obstacle to the dispersal of decapod crustaceans.

The decapod fauna from the bank has a strong affinity with that of the Gulf of Mexico, and to a lesser extent with that of the western and southern Caribbean Sea. Eighty-eight species (81%) are common to the Gulf, 53 of which (49%) have been reported in the Florida Keys region; and 66 species (61%) also occur in the Caribbean. These affinities are explainable by the area's pattern of oceanic circulation which influences the dispersal of larval stages. The waters that enter the Yucatan Channel flow well into the Gulf as far north as 27° latitude, and then move south adjacent to the west Florida shelf forming the eastern Gulf Loop Current which ultimately joins the Florida Current (Jones *et al.*, 1973). As indicated above, the distributional data for decapods suggest that the Loop Current and the Florida Current may act as important vehicles for the transport of larval stages from northern Yucatan, the Florida Keys, and western Cuba to the Bahamas region.

The geographic distribution of the species from Cay Sal Bank tends to support Chace's (1972) assertion that there is an absence of barriers in the West Indies for species with pelagic larvae. Moreover, Chace's suggestion that there is probably no endemic natantian marine fauna in the Caribbean may also be true for other decapod groups.

The group of penaeoid and caridean shrimps from the slope of the bank has broad geographic distribution. A strong affinity with the eastern Atlantic fauna is evident in these species. Of the 20 shrimp species found on the slopes, ten also occur in the eastern Atlantic region. The close relationship between the slope shrimp faunas from the western and eastern Atlantic has been noted by Crosnier and Forest (1973) who attributed this broad geographic distribution to the ex-

tended pelagic life of these taxa. The capture of *Ligur ensiferus* and *Plesionika williamsi* in the western Atlantic provides additional evidence of the close relationship between the shrimp faunas of both sides of the Atlantic Ocean.

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